

**AMENDMENTS TO THE CLAIMS**

**This listing of claims will replace all prior versions and listings of claims in the application:**

**LISTING OF CLAIMS:**

1-54. (Canceled)

55. (Currently Amended) ~~An installation as claimed in claim 54~~ An installation for processing metal bars for concrete reinforcement, comprising:

first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising a bending unit (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

wherein said first means for transferring comprise:

- a supporting frame (13) in the installation,
- a gripper (2), including:
  - a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and
  - a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,

Amendment Under 37 C.F.R. § 1.116  
USSN 10/607,205  
Attorney Docket Q76357  
November 30, 2005

- wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which in turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and

- wherein means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in an angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is movable along said longitudinal and transverse directions (A, X) relative to the bending station,

- wherein the gripper (2) is able to be moved along any of said two directions (A, X) to grip the bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation, and

wherein the same grippers (2) are arranged so that they can be used both as the first means for transferring the bars (B) from the first station (20) to the bending station and as the second means for transferring the bars (B) from said bending station to the third unloading station (28), wherein the supporting frame for the gripper is a frame overlying the first station, the bending station and the unloading station.

56-62. (Canceled)

63. (Currently Amended) ~~An installation as claimed in claim 54~~ An installation for processing metal bars for concrete reinforcement, comprising:

first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising a bending unit (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

wherein said first means for transferring comprise:

- a supporting frame (13) in the installation,
- a gripper (2), including:
  - a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and
  - a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,
  - wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which in turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and
  - wherein means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in an angular position around said axis of articulation (4) relative to the gripper supporting structure,

while the gripper supporting structure is movable along said longitudinal and transverse directions (A, X) relative to the bending station,

- wherein the gripper (2) is able to be moved along any of said two directions (A, X) to grip the bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation, and

wherein the same grippers (2) are arranged so that they can be used both as the first means for transferring the bars (B) from the first station (20) to the bending station and as the second means for transferring the bars (B) from said bending station to the third unloading station (28), wherein the gripper supporting structure (5) is mounted on a carriage (6) which is movable along an overhead cross member structure (8) which in turn is movable in the manner of an overhead traveling crane relative to the supporting frame (13).

64. (Currently Amended) ~~An installation as claimed in claim 56~~An installation for processing metal bars for concrete reinforcement, comprising:

first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising a bending unit (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

wherein said first means for transferring comprise:

- a supporting frame (13) in the installation,

Amendment Under 37 C.F.R. § 1.116  
USSN 10/607,205  
Attorney Docket Q76357  
November 30, 2005

- gripper means (2), each including:
- a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and
- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,
- wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which in turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and
- wherein means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in an angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is movable along any of said longitudinal and transverse directions (A, X) relative to the bending station,
- wherein the gripper (2) is able to be moved along any of said two directions (A, X) to grip the bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation, and

wherein said first station (20) is a supporting surface (50) whereon the bars are supplied to be cut into segments of predetermined length, wherein the gripper supporting structure (5) is mounted on a carriage (6) which is movable along an overhead cross member structure (8) which in turn is movable in the manner of an overhead traveling crane relative to the supporting frame (13).

65. (Currently Amended) ~~An installation as claimed in claim 59~~An installation for processing metal bars for concrete reinforcement, comprising:

first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising a bending unit (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

wherein said first means for transferring comprise:

- a supporting frame (13) in the installation,
- a gripper (2), including:
- a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and
- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,

- wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which in turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and

- wherein means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in an angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is movable along said longitudinal and transverse directions (A, X) relative to the bending station,

- wherein the gripper (2) is able to be moved along any of said two directions (A, X) to grip the bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation, and

wherein the same grippers (2) are arranged so that they can be used both as the first means for transferring the bars (B) from the first station (20) to the bending station and as the second means for transferring the bars (B) from said bending station to the third unloading station (28),

wherein said gripper supporting structure (5) is movable also in a third direction which is perpendicular to a working plane (21) of said bending station; and

wherein the gripper supporting structure (5) is slidably mounted along said third direction on a carriage (6) which is movable along an overhead cross member structure (8) which in turn is movable in the manner of an overhead traveling crane relative to the supporting frame (13).

66. (Previously Presented) An installation as claimed in claim 65, wherein the two directions of movement of said carriage (6) and said overhead cross-member structure (8) are horizontal and said third direction of movement of said gripper supporting structure is vertical.

67. (Previously Presented) An installation as claimed in claim 65, wherein the two directions of movement of said carriage (6) and said overhead cross-member structure (8) are horizontal and said third direction of movement of said gripper supporting structure is inclined both to the vertical and the horizontal.

68. (Previously Presented) An installation as claimed in claim 63, wherein the gripper supporting structure comprises a plurality of grippers (2), with their respective carriages (6) carried on a common overhead cross-member structure (8).

69. (Previously Presented) An installation as claimed in claim 64, wherein the gripper supporting structure comprises a plurality of grippers (2), with their respective carriages (6) movable along respective overhead cross-member structures (8) able to slide in the manner of overhead traveling cranes on the support frame (13).

70. (Currently Amended) ~~An installation as claimed in claim 56~~ An installation for processing metal bars for concrete reinforcement, comprising:



first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising a bending unit (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

wherein said first means for transferring comprise:

- a supporting frame (13) in the installation,
- gripper means (2), each including:
  - a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and
  - a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,
  - wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which in turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and
  - wherein means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in an angular position around said axis of articulation (4) relative to the gripper supporting structure,

while the gripper supporting structure is movable along any of said longitudinal and transverse directions (A, X) relative to the bending station,

- wherein the gripper (2) is able to be moved along any of said two directions (A, X) to grip the bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation, and

wherein said first station (20) is a supporting surface (50) whereon the bars are supplied to be cut into segments of predetermined length, wherein the bending station comprises two mutually spaced apart bending units (22), positioned laterally relative to the bench (50), whereon the cut bars are set down to be bent according to predetermined shapes and in that the two bending units (22) are movable with respect to one another along the longitudinal direction (A) of the bars.

71. (Canceled)

72. (Currently Amended) ~~An installation as claimed in claim 56~~An installation for processing metal bars for concrete reinforcement, comprising:

first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising a bending unit (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

wherein said first means for transferring comprise:

- a supporting frame (13) in the installation,
- gripper means (2), each including:
- a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and
- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,
- wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which in turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and
- wherein means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in an angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is movable along any of said longitudinal and transverse directions (A, X) relative to the bending station,
- wherein the gripper (2) is able to be moved along any of said two directions (A, X) to grip the bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending

Amendment Under 37 C.F.R. § 1.116  
USSN 10/607,205  
Attorney Docket Q76357  
November 30, 2005

station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation, and

wherein said first station (20) is a supporting surface (50) whereon the bars are supplied to be cut into segments of predetermined length, wherein the first station further includes a support plane arranged adjacent to said supporting surface for receiving the cut bars, said plane being defined by the upper branches of a plurality of endless chains (30) arranged in vertical planes parallel to said transverse direction (X).

73. (Currently Amended) ~~An installation as claimed in claim 56~~An installation for processing metal bars for concrete reinforcement, comprising:

first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising a bending unit (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

wherein said first means for transferring comprise:

- a supporting frame (13) in the installation,
- gripper means (2), each including:
- a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and

- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,

- wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which in turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and

- wherein means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in an angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is movable along any of said longitudinal and transverse directions (A, X) relative to the bending station,

- wherein the gripper (2) is able to be moved along any of said two directions (A, X) to grip the bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation, and

wherein said first station (20) is a supporting surface (50) whereon the bars are supplied to be cut into segments of predetermined length, further comprising unloading means for unloading bars which are not to be subjected to a bending operation from said supporting surface on a side thereof opposite to that facing the bending station.

74. (Previously Presented) An installation as claimed in claim 73, wherein said unloading means comprises roller tracks to receive bars which are not to be subjected to a bending operation.

75. (Canceled)

76. (Currently Amended) ~~An installation according to claim 75~~ An installation for processing metal mean bars for concrete reinforcement, comprising:

first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising bending units (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

wherein said first means for transferring comprise:

- a supporting frame (13) in the installation,
- grippers (2), each including:
- a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and
- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,

- wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which on its turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and in that

- wherein means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in any angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is movable along any of said longitudinal and transverse directions (A, X) relative to the bending station,

- wherein the gripper (2) is able to be moved along any of said two directions (A, X) to grip the bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation,

wherein said gripper supporting structure (5) is movable also in a third direction which is perpendicular to a working plane (21) of said bending station, said third direction being inclined both to the vertical and the horizontal, wherein the gripper supporting structure (5) is slidably mounted along said third direction on a carriage (6) which is movable along an overhead cross member structure (8) which in turn is movable in the manner of an overhead traveling crane relative to the supporting frame (13), and

wherein the two directions of movement of said carriage (6) and said overhead cross-member structure (8) are horizontal.

77. (Previously Presented) An installation as claimed in claim 76, wherein the first station includes a support plane defined by upper branches of a plurality of endless chains (30) arranged in vertical planes parallel to said transverse direction (X).

78. (Canceled)

79. (Currently Amended) ~~An installation as claimed in claim 78~~ An installation for processing metal bars for concrete reinforcement, comprising:

first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising bending unit means (22), and second means for transferring the bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

in which said first transferring means comprise:

- a supporting frame (13) in the installation,
- grippers (2), including:
- a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station, at least along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation, and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and

- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,



- wherein said pair of jaws (2a) of the gripper (2) are mounted on a wrist member (3) which on its turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and

- wherein means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in any angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is able to be moved along any of said longitudinal and transverse directions (A, X) relative to the bending station,

- so that the gripper (2) is able to be moved along any of said two directions (A, X) to grip said bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation,

wherein said gripper supporting structure (5) is movable also in a third direction which is perpendicular to a working plane (21) of said bending station, and

wherein the wrist member (3) of each gripper (2) is pivotally mounted around said articulation axis (4) on a structure which is pivotally supported by said gripper supporting structure (5) around an axis parallel to said third direction, wherein means are provided for controlling the grippers, programmable to calculate the position of the centre of gravity of the bars.

80. (Currently Amended) ~~An installation as claimed in claim 78~~An installation for processing metal bars for concrete reinforcement, comprising:

first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising bending unit means (22), and second means for transferring the bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

in which said first transferring means comprise:

- a supporting frame (13) in the installation,
- grippers (2), including:
- a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station, at least along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation, and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and

- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,

- wherein said pair of jaws (2a) of the gripper (2) are mounted on a wrist member (3) which on its turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and

- wherein means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in any

angular position around said axis of articulation (4) relative to the gripper supporting structure,  
while the gripper supporting structure is able to be moved along any of said longitudinal and  
transverse directions (A, X) relative to the bending station,

- so that the gripper (2) is able to be moved along any of said two directions (A, X) to  
grip said bars (B) at said first station (20), keeping them substantially side by side with respect to  
each other in a plane having a first orientation, and to deposit said bars (B) at said bending  
station always keeping them substantially side by side with respect to each other in a plane  
having a second orientation which can be different from said first orientation,

wherein said gripper supporting structure (5) is movable also in a third direction which is  
perpendicular to a working plane (21) of said bending station, and

wherein the wrist member (3) of each gripper (2) is pivotally mounted around said  
articulation axis (4) on a structure which is pivotally supported by said gripper supporting  
structure (5) around an axis parallel to said third direction, wherein sensor means are associated  
with said gripper to sense positions along the bars where the bars can be gripped.

81. (Previously Presented) An installation for processing metal bars for  
concrete reinforcement, comprising:

first transferring means for transferring said bars (B) from a first station (20) which  
receives bars which are to be subjected to a bending operation in said installation to a bending  
station, comprising bending units (22), and second means for transferring said bars (B) from said  
bending station, once the bars have been bent therein, to a third unloading station (28),

in which said first transferring means comprise:

- a supporting frame (13) in the installation,
- grippers (2), each including:
  - a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station, at least along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation, and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and
    - a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,
      - wherein said pair of jaws (2a) of the grippers (2) are mounted on a wrist member (3) which on its turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and
        - wherein controlling means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in any angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is able to be moved along any of said longitudinal and transverse directions (A, X) relative to the bending station,
        - so that the gripper (2) is able to be moved along any of said two directions (A, X) to grip one or more bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said

bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation,

wherein the bending station comprises two bending units (22) spaced apart from each other and aligned in the longitudinal direction (A) of the bars (B), as well as a plurality of tables which are movable between a raised operative position where they define a support plane for the bars in the space along the longitudinal direction (A) between the two bending units or also longitudinally outside of said space, and a lowered inoperative position, where they do not interfere with the movement of the bending units in the longitudinal direction.

82. (Previously Presented) An installation for processing metal bars for concrete reinforcement, comprising:

first transferring means for transferring said bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising bending units (22), and second means for transferring said bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

in which said first transferring means comprise:

- a supporting frame (13) in the installation,
- grippers (2), each including:
- a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station, at least along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation, and

along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and

- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,

- wherein said pair of jaws (2a) of the gripper (2) are mounted on a wrist member (3) which is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and

- wherein controlling means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in any angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is able to be moved along any of said longitudinal and transverse directions (A, X) relative to the bending station,

- so that the gripper (2) is able to be moved along any of said two directions (A, X) to grip one or more bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation,

wherein an auxiliary support is associated to a bending unit (22) said auxiliary support being movable between an inoperative retracted position and an operative position in which the auxiliary support surmounts at least partially a revolving disk of the bending unit, in such a way that, in a cycle of bending operations necessary to obtain a closed loop stirrup of quadrangular

shape starting from a rectilinear bar, it is assured, in the final phase of the bending cycle, that the end portions of the bar constituting each stirrup are mutually approached without risk of interference between the bar portions in motion and a central mandrel of the bending unit and/or the opposite ends of the bars.

83. (Currently Amended) ~~An installation as claimed in claim 57~~ An installation for processing metal bars for concrete reinforcement, comprising:

first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising a bending unit (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

wherein said first means for transferring comprise:

- a supporting frame (13) in the installation,
- a gripper (2), including:
- a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and
- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,

- wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which in turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4), and

- wherein means are provided for controlling the rotation of said wrist member of each gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in an angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is movable along said longitudinal and transverse directions (A, X) relative to the bending station,

- wherein the gripper (2) is able to be moved along any of said two directions (A, X) to grip the bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation, and

wherein the same grippers (2) are arranged so that they can be used both as the first means for transferring the bars (B) from the first station (20) to the bending station and as the second means for transferring the bars (B) from said bending station to the third unloading station (28), and

in which the bending unit (22) comprises a revolving disk for supporting the bars to be bent, with a central axial mandrel (23) about which the bars are bent and an eccentric bending pin (24) for bending the bars about the mandrel, as well as an abutment element (25) against which the bars bear laterally during the bending operation, said central mandrel (23) and said



abutment element (25) defining between them a gap for receiving the bars to be bent, arranged side by side to each other in a plane substantially perpendicular to the plane of the bending disc (21),

wherein the bending unit comprises adjustment means for adjusting the distance between the mandrel (23) and a butting organ (25) in a direction transverse to the longitudinal direction (A) and control means for commanding said adjustment means to adjust automatically the width of the space for receiving the bars as a function of the diameter of the bars.

84-85. (Canceled)

86. (Currently Amended) ~~A method as claimed in claim 84~~A method for transferring a plurality of bars (B) in an installation for processing metal bars for concrete reinforcement, in which said installation comprises first transferring means for transferring bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising bending units (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

in which said first transferring means comprise:

- a supporting frame (13) in the installation,
- grippers (2), each including:
- a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station, at least along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation, and

along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and

- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,

- wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which on its turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4),

- wherein the rotation of said wrist member of each gripper about said axis of articulation (4) is controlled for orienting said gripper (2) in any angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is movable along any of said longitudinal and transverse directions (A, X) relative to the bending station, and

- wherein said first transferring means are controlled in such a way as to grip the bars (B) at said first station (20), which are arranged substantially side by side in a first plane having a first orientation, and to deposit said bars at said bending station, arranged substantially side by side in a second plane having a second orientation which can be different from said first orientation, wherein the bent bars are gripped in proximity to the projection of their centre of gravity along the transverse direction (X) and/or the longitudinal direction (A).

87. (Currently Amended) ~~A method as claimed in claim 84~~A method for transferring a plurality of bars (B) in an installation for processing metal bars for concrete reinforcement, in which said installation comprises first transferring means for transferring bars (B) from a first

station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising bending units (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

in which said first transferring means comprise:

- a supporting frame (13) in the installation,
- grippers (2), each including:
  - a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station, at least along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation, and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and
  - a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,
  - wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which on its turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4),
  - wherein the rotation of said wrist member of each gripper about said axis of articulation (4) is controlled for orienting said gripper (2) in any angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure

is movable along any of said longitudinal and transverse directions (A, X) relative to the bending station, and

- wherein said first transferring means are controlled in such a way as to grip the bars (B) at said first station (20), which are arranged substantially side by side in a first plane having a first orientation, and to deposit said bars at said bending station, arranged substantially side by side in a second plane having a second orientation which can be different from said first orientation, wherein controlling means are provided for controlling the grippers which are programmable to calculate the position of the centre of gravity of the bars.

88-92. (Canceled)

93. (Currently Amended) ~~A method as claimed in claim 84~~ A method for transferring a plurality of bars (B) in an installation for processing metal bars for concrete reinforcement, in which said installation comprises first transferring means for transferring bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising bending units (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

in which said first transferring means comprise:

- a supporting frame (13) in the installation,

- grippers (2), each including:

- a gripper supporting structure (5) guided on said supporting frame, so as to be

movable in the installation, relative to the bending station, at least along a first direction (A)

which is horizontal and parallel to a longitudinal direction of the bars in the installation, and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and

- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,

- wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which on its turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4),

- wherein the rotation of said wrist member of each gripper about said axis of articulation (4) is controlled for orienting said gripper (2) in any angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is movable along any of said longitudinal and transverse directions (A, X) relative to the bending station, and

- wherein said first transferring means are controlled in such a way as to grip the bars (B) at said first station (20), which are arranged substantially side by side in a first plane having a first orientation, and to deposit said bars at said bending station, arranged substantially side by side in a second plane having a second orientation which can be different from said first orientation, wherein points at which the bars are gripped in the first station are calculated as a function of parameters unloading weight distribution, length and diameter of the bars.

94. (Previously Presented) A method as claimed in claim 93, wherein when unloading the bent bars from the bending station, the distance along the longitudinal direction

Amendment Under 37 C.F.R. § 1.116  
USSN 10/607,205  
Attorney Docket Q76357  
November 30, 2005

(A) between grippers (2) and mandrels (23) of the bending units is calculated as a function of parameters including bar diameter, bar length, and length of the overhanging segment beyond the closest gripper.

95. (Currently Amended) ~~A method as claimed in claim 84~~ A method for transferring a plurality of bars (B) in an installation for processing metal bars for concrete reinforcement, in which said installation comprises first transferring means for transferring bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station, comprising bending units (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28).

in which said first transferring means comprise:

- a supporting frame (13) in the installation,
- grippers (2), each including:
- a gripper supporting structure (5) guided on said supporting frame, so as to be movable in the installation, relative to the bending station, at least along a first direction (A) which is horizontal and parallel to a longitudinal direction of the bars in the installation, and along a second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of the bars, and
- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable between an opened condition and a closed condition,

Amendment Under 37 C.F.R. § 1.116  
USSN 10/607,205  
Attorney Docket Q76357  
November 30, 2005

- wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3) which on its turn is pivotally mounted on said gripper supporting structure (5) around a substantially horizontal axis of articulation (4),

- wherein the rotation of said wrist member of each gripper about said axis of articulation (4) is controlled for orienting said gripper (2) in any angular position around said axis of articulation (4) relative to the gripper supporting structure, while the gripper supporting structure is movable along any of said longitudinal and transverse directions (A, X) relative to the bending station, and

- wherein said first transferring means are controlled in such a way as to grip the bars (B) at said first station (20), which are arranged substantially side by side in a first plane having a first orientation, and to deposit said bars at said bending station, arranged substantially side by side in a second plane having a second orientation which can be different from said first orientation, wherein programmable means are provided for controlling the motion of the grippers (2), which control the velocity of motion as a function of parameters including bar diameter, length of the tail segment of the bar positioned beyond the closest gripper, weight of the bars, shape of the bar (in the case of bent bars), and number of the bars.

96-97. (Canceled)

98. (Currently Amended) ~~An installation according to claim 75~~ An installation for processing metal bars for concrete reinforcement, comprising:

first means for transferring the bars (B) from a first station (20) which receives bars which are to be subjected to a bending operation in said installation to a bending station,

comprising bending units (22), and second means for transferring bars (B) from said bending station, once the bars have been bent therein, to a third unloading station (28),

wherein said first means for transferring comprise:

- a supporting frame (13) in the installation,

- grippers (2), each including:

- a gripper supporting structure (5) guided on said supporting frame, so as to be

movable in the installation, relative to the bending station along a first direction (A) which is

horizontal and parallel to a longitudinal direction of the bars in the installation and along a

second direction (X) which is horizontal and perpendicular to the longitudinal direction (A) of

the bars, and

- a pair of jaws (2a) mounted on said gripper supporting structure (5) and movable

between an opened condition and a closed condition,

- wherein said pair of jaws (2a) of each gripper (2) are mounted on a wrist member (3)

which on its turn is pivotally mounted on said gripper supporting structure (5) around a

substantially horizontal axis of articulation (4), and in that

- wherein means are provided for controlling the rotation of said wrist member of each

gripper about said axis of articulation (4) so as to be capable of orienting said gripper (2) in any

angular position around said axis of articulation (4) relative to the gripper supporting structure,

while the gripper supporting structure is movable along any of said longitudinal and transverse

directions (A, X) relative to the bending station,



- wherein the gripper (2) is able to be moved along any of said two directions (A, X) to grip the bars (B) at said first station (20), keeping them substantially side by side with respect to each other in a plane having a first orientation, and to deposit said bars (B) at said bending station always keeping them substantially side by side with respect to each other in a plane having a second orientation which can be different from said first orientation,

wherein said gripper supporting structure (5) is movable also in a third direction which is perpendicular to a working plane (21) of said bending station, said third direction being inclined both to the vertical and the horizontal, wherein the movable support structure is mounted on a carriage which is movable along an overhead cross member structure which in turn is movable in the manner of an overhead traveling crane on overhead beams of a frame which overlies the installation, said overhead beams extending parallel to the working plane of said bending station.